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ABSTRACT

Little is known about the transition from the use of Latin to the use of German in scientific literature. In the sixteenth and seventeenth centuries, Latin texts by Albrecht Durer and Johannes Kepler were bestsellers while the German versions were unpopular. German mathematics became acceptable only after 1700, with the work of Christian Wolff. Christian Thomasius, a Wolff colleague, was the first to announce a lecture in German. In 1680, for the first time, more titles were printed in German than in Latin in Germany, and by 1800, no more than four percent of all books printed there were in Latin. Germany appears to have lagged behind Italy, France, Holland, and England in the adoption of the vernacular for the sciences. The transition was part of an overall process of nationalization of the sciences in Europe, which was then forming its modern nation states. However, this opening of horizons had some costs: there was no longer a universally understood language; the sciences became a national, and sometimes nationalistic, enterprise; science became a tool of political power; the language of science lost its pliability and unambiguousness; scientific literature gained the potential for misinterpretation by non-scholars; and in some cases, science became mythologized into doctrine. (MSE)

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The Transition from Latin to German in the Natural Sciences - and its Consequences.

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Summary

The gap between natural sciences and humanities today makes it worthwhile to take a look at the development of national languages used in the field of science. Except for Olschki's studies in 'Geschichte der neusprachlichen wissenschaftlichen Literatur' I-III,(1918-1927), little has been done so far to work out this aspect of language history, and there is still no general survey of the relation between Latin and the European modern standard languages.

The 'nationalizing' of the various sciences has positively and negatively influenced both international communication and the popular use of theories. The work of Thomasius and posthumous essays by Leibniz are regarded as important steps towards the use of the vernacular language in the sciences in Germany. A statistical survey based on the books owned by the 'Herzog August Bibliothek' in Wolfenbüttel shows the slow increase in the use of German compared to Latin in the book production between 1500 and 1800.

A look at the foundation of scientific academies and societies in Florence, Paris and London, and at the use of vernacular language by European scientists shows that Germany was a latecomer in this respect.

Closer attention is ~~then~~ paid to the sociological conditions of the change ~~/ to the innovator in medicine Paracelsus~~ and the early founders of mathematical language, Albrecht Dürer, Johannes Kepler and Christian Wolff.

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The transition from the use of Latin to the use of German in the natural sciences has so far not been studied. There is nothing to compare with Olschki's splendid 3 volume History on the vernacular scientific literature of Italy between Leonardo da Vinci and Galilei which was written between 1918 and 1927.

Two factors might explain why Olschki failed to execute his plan of providing a similar study for the transition from Latin to German. First of all, the body of that literature is enormous and disparate. Secondly it is a-synchronous: the political, religious and academic splintering of Germany between the 17th and 19 th century created a fractured linguistic landscape. Furthermore, C.P. Snow's "gap" between the "two cultures" deepened in Germany at the beginning of the 19th century at the very moment when the German Language was becoming the subject of a new science. This new science, the "Germanische Philologie", concentrated on the language of poetry, of old arts and crafts and on German dialects while almost totally neglecting the study of language-forms that came into being in the new natural sciences. Even 20th century dictionaries sometimes neglect this area.

In this unexplored ocean I want to sketch the outlines of five islands, which may serve as points of orientation in the discussion.

Dürer, Kepler and Wolff.

In 1525 Albrecht Dürer, the artist, published an "Instruction for measurements by means of compass and straightedge". The booklet was meant as a practical guide for apprentices who had to approach drawing and painting

with "geometric exactitude". In this guide Dürer proposes a new German terminology. He shuns the otherwise common loan-translations that ape, step by step, the composition of Greek and Latin models. In speaking about the diameter of a circle he does not use the word Durch-Messer (1667) but searches for a strong vernacular term and comes up with Zwerch-Linie. Zwerch means 'across' in Old German, and we still use it in Zwerch-Fell (Fell, meaning that raw skin for which English has "pelt") - Zwerch-Fell meaning 'diaphragm'. Ellipsis he calls Eier-Linie, "egg-line", a line that resembles an egg. The parabola he calls a "burn-line", Brenn-Linie, because a parabolic mirror causes a fire to kindle. And the hyperbola shall be called the fork-line, Gabel-Linie." Like his contemporary Luther he tries to incorporate the new concepts into the genius of the vernacular language. In 1616, Johannes Kepler published an "Art of Measurement" according to Archimedes. Its purpose was eminently practical: the calculation of the content of vats. At the time Kepler wrote this guide, he was working for the Austrian government. His booklet was destined for use by official wine-testers, and was part of an attempt to establish supra-regional norms. In the German version which he prepared himself, Kepler drew heavily on Dürer. Kepler, too, wanted to elaborate a German terminology with concepts cast in concrete and clearly visual descriptions. He was a Swabian, born near Stuttgart. For segment he says Schnitz, a word which means 'splinter' or 'split', but which is still used by my Swabian wife when she refers to a slice of orange. For Kepler the cylinder is a 'round column' and the pyramid is a 'pointed' one. For the tangent, which just touches the circle, he invented the term Anstreicher - derived from

streichen, which here means 'a slight touch or stroke'.

In Latin the texts by Dürer and Kepler became European bestsellers. The German versions, however, had at best local influence and were not reprinted. Only after 1700 did German Mathematics become generally acceptable, and Christian Wolff may be considered its originator. He was a professor of Mathematics, Natural Sciences and Philosophy in the Prussian town of Halle. In 1734 he published a mathematical dictionary whose vocabulary was made up in almost equal parts of Latin and of German terms, some of which were taken from Dürer and Kepler. Wolff published on many different subjects and he did so in a new style: it is clear, it shuns emotionality and it uses defined concepts as building blocks for carefully and economically constructed sentences. It avoids both redundancy and anything that might inspire the imagination of the reader. Through his writings Wolff had a considerable impact on public discourse: his style is the first German example of one-dimensional language.

Thomasius' groundwork

We cannot but ask: How did Wolff's writings on Philosophy and Natural Sciences in German come to have such an impact on the German language? In Halle Wolff was a colleague of Thomasius, the first German academic ever to announce a lecture in German. That happened in 1687 in Leipzig. In 1687, at 32, Thomasius already had upset his colleagues in Leipzig by wearing civil dress ('Kavalierskleidung') at a lecture, instead of the traditional cap and gown. That year on Easter Sunday he again scandalized Leipzig by pinning on the University noticeboard a public announcement which stated that he would lecture on Garcian in German. The calculated affront to tradition must have come as a great shock. Thirty years later, as a famous professor, Thomasius still remembers his apprehension that his horrid announcement would be washed with holy water from the venerable bulletin-board:

" Denckt doch! ein teutsch programma an das lateinische schwartze Bret der löbl. Universität. Ein solcher Greuel ist nicht erhöret worden, weil die Universität gestanden. Ich muste damals in Gefahr stehen, dasz man nicht gar solemni processione das löbliche schwartze Bret mit Weyhwasser besprengte."

Because it was indeed the first solemn "intimatio" to be published in German. Thomasius had shrewdly planned his step by choosing the right theme. Obviously the French were ahead of the Prussians. In France, 50 years earlier, the hold of the Latinist humanists on the curriculum had been shaken. The court had replaced the university as the forum of high prestige. The wordly and practically useful 'honnête homme' had cast a shadow over the Latin humanist. Thomasius set out to obtain an analogous shift in Germany, by redefining the University's goals. To pursue his purpose, he announced a discussion on ways and means to follow, on this point of language, the French way of life, by discussing Garcian's rule "How to live reasonably, wisely and decently".To suggest that University ought to teach how to live was quite an innovation. In retrospect, the university he wanted looks like a sophisticated 18th century Knigge - or perhaps Ann Landers -, and the appropriate kind of discourse made it necessary to abandon Latin.(During this same period, Leibniz wrote two essays demanding a transition from Latin to the vernacular, but he did not publish them). In his writings Thomasius demonstrated that neither philosophy nor morals nor education were prisoners of Latin. Quite the contrary, he argued: Latin could easily become an obstacle to their pursuit. The Latin

University was frozen in an antiquated curriculum, and its stiff procedures distorted the mind. Understandably Thomasius did not survive Leipzig. He switched to Halle, where he succeeded in introducing German, in addition to Latin, as a medium of instruction, and he did so despite a Prussian decree forbidding its use. Thus it was Thomasius who prepared the milieu within which Christian Wolff, his contemporary, could spread his "scientific" prose.

From Latin to German in Printing

The demands formulated by Thomasius and Leibniz are reflected in publishing trends. It was only 150 years after Luther, in 1680, that for the first time more titles were printed in German than in Latin. This shift did not happen at once, it took some 300 years. In 1500, only 10% of all printed material was in German. Even at the early time there were quite a number of technical books, using the terminology of crafts and arts. By 1800, no more than 4% of all books printed in Germany were in Latin. This transition from Latin to German as the language of printing did not follow a smooth pattern: for well over a century it was a neck and neckrace. A clear decision in favor of German came only in the final decades of the 18th century, at least as far as mathematics and science were concerned. So far no statistics have been analyzed to document this trend, but from two major sources that I have studied, it becomes quite clear.- Firstly, the sales catalogues of the Frankfurt and Leipzig bookfairs that were published continuously from 1590 onwards, usually every six months, and secondly a special library catalogue that I have used.

The sales catalogues that were published over hundreds of years have two shortcomings. They are not exhaustive of the year's total production, and not even a single copy of half of the items mentioned in them during the 30-years' War in Germany has survived. Nonetheless they do allow some generalizations, as Jentzsch already noticed in 1912. What we learn from the sales catalogues is confirmed by the catalogues of new acquisition at the Library of Wolfenbüttel. In this quiet town not far from Hannover and several miles from the border that now cuts through Germany, Prince August of Braunschweig founded a library of exeptional beauty. Among its chief librarians rank Leibniz and Lessing. I have examined its growth. In 1780 Latin still clearly dominates the Natural Sciences, but only 20 years later five out of six books in the sciences are in German.

The goal: vernacular science. The role of Academies.

The transition from Latin literacy to vernacular science happened everywhere in Europe, but not everywhere at the same place. I am tempted to compare the decline of Latin with a horserace giving the following results: Italy is far ahead, followed by France. In the middle of the field Holland vies with England, they are both well in front of Germany and Switzerland; the back-markers are Sweden, Austria, Poland amongst others. I have prepared a list of key authors in Mathematics and Natural Sciences, comparing their publications in Latin and the vernacular. The pattern described above emerges clearly from the examination of several dozen authors. In addition, it is confirmed by looking at the history of the Academies that were founded during this period in several European countries.

In 1541 Cosimo I ordered the University of Florence to open its doors to the citizens and to give public lectures in Italian. He intended to legitimize his position as Prince by gaining the support of a citizenship rooted in the language of everyday intercourse. He ordered the professors to give public talks in Italian, beginning with a sentence of the Divine Commedy which had to be explicated. In that year, 1541, Florence created the first Academy, later to be known as the Academia della Crusca. Almost a hundred years later, in 1635, the 'Academie Francaise' was established; thirty years later the 'Royal Society' was founded. Not until 1700 did Prussia get her 'Berliner Sozietät'.

These foundations were crucial for the passage from Latin to vernacular science because, except in Prussia, the vernacular was the language of the Academy. Their foundation was intended as a contribution to the popularization of science and to the public pursuit of the applied sciences. Governments supported them and profited from their growth. Over and over again, strong feelings surfaced in these Academies, feelings directed against the cloistering of the sciences within the walls of University and imprisonment in the Latin language. Thus the natural sciences did not only develop but also grew up outside the University, their roots being in the crafts, the 'artes mechanicae' and 'artes magicae' of the Middle Ages. Under the pressure of the rising nation state and its interests they became equally detached from the tradition of Humanistic literacy. The cleavage between our Sciences and our Humanities goes back at least that far, the gap between the "two cultures",

The race towards Vernacular Science reflects the rivalry and competition between the European nations, which at that time were taking on their modern form of nation states. The "nationalization" of Europe cannot be separated from the creation of science in national tongues. It is a true race, a race toward modernity. In France, the Pleiáde attempts to outdo Italy. England and France compete. In Germany Leibniz berates the backwardness of Science and the lack of any German terminology capable of serving scientific purposes.

New horizons and their cost

Understandably enough, the feud between the advocates of Latin and the proponents of the vernacular language in the sciences was violent. It was a change with serious consequences and one can only be amazed at how little scholarly attentions it has attracted to date.

No doubt, in this process new horizons were opened:

1. The new right to express one's scientific view of the world in one's native tongue made it possible to look beyond the blinkers imposed by Latin convention. Science comes closer to everyday life.

2. The new obligation, imposed on the scientific author, to cast his argument in his native tongue enables his common-sense-reader to unmask its fallacies. In this way science also becomes more democratic.

3. The new exigency to formulate scientific observations and arguments in the national tongue yields a new kind of elegance in 19th century prose. Science becomes a kind of literature.

4. With its most outstanding works this new prose becomes a touchstone and challenge for literary texts. The Language of science is imitated in other genres.

5. The displacement of Latin by the vernacular levels the barriers between academy and city. Cosimo succeeded.

6. Finally, the words and concepts borrowed from science enrich everyday language and enable it to roam far beyond its traditional confines.

However, these new horizons were created at a heavy cost:

1. The universal European tongue that had lasted for many generations - the 'lingua Europeae universalis et durabilis ad posteritatem' of Leibniz - does no longer exist. And Science ceased to be universal for some time.

2. As a result, science often became a national, not infrequently a nationalistic, enterprise.

3. Paradoxically, the new openness of scientific enterprise invited a new kind of supervision, of management and exploitation that made Science into a tool of power. Latin had functioned as a 'wall' of protection (as in the case of Galileo Galilei. As long as Galileo published his ideas in Latin, there was no danger. But as soon as he began to write in the vernacular, the Inquisition went into action.

4. The "language of science" lost its pristine character of a pliable tool that could be used unambiguously within any chosen field. An artificial Latin language, stripped of all vernacular associations and connotations, was lost and increasingly substituted by a new universal language of algorithms which is no longer language. Or by a new mixture, made up of vernacular and scientific language.

5. As the learned man became the new scientific author, he found himself faced with a dilemma. Every modern language can be divided into two or more codes, which on the surface appear to constitute a seamless whole, but which in reality derive from heterogeneous principles. As a result, the writer could not avoid addressing a general public when formulating a description intended for his peers. Thus, the terms he used acquired a new kind of duplicity: they are chosen to do their job as technical terms, yet inevitably they resonate in an often totally different register within ordinary speech. They constantly tempt the author to calculate their effect and - willy nilly - turn into literally "cockeyed" concepts.

6. When scientific codes are constructed in this kind of language, they have the tendency to act as dominant myths that overshadow everyday lives. They become suitable for use as instruments and, as instruments, change from hypothesis to doctrine. "Marx", "Darwin", and "Freud" are just some of the labels for such domineering codes.

7. Even the use of sundry bits from these terminological loanwords in everyday speech can conjure these powerful myths. Thus, they overshadow simple conversation and, surrepeticiously, empty it of all concrete, personal referents.

Thus scholarly language is increasingly using the vernacular to its own advantage, thereby plundering all the power and prestige for itself. Sometimes the vernacular language might look like Gregor Samsa in Kafka's story 'Metamorphosis', who one morning found himself transformed into a gigantic insect, and was later bombarded by his father with apples. Gregor did not cease to love those who had transmuted him. "The rotting apple in his back and the inflamed area around it, all covered with soft dust, hardly troubled him any more. He thought of his family with tenderness and love."

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